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EXAMINER

SHAW, PELING ANDY

ART UNIT	PAPER NUMBER
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2144

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/010,918

Applicant(s)

CHERITON, DAVID R.

Examiner

Peling A. Shaw

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7,9-15,17-22,24-30,32-38,40-46,48-54 and 56-58 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7,9-15,17-22,24-30,32-38,40-46,48-54 and 56-58 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07 December 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application
- ☐ Other: _____

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DETAILED ACTION

Continued Examination under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/30/2007 has been entered. Claims 1, 9, 17, 24, 32, 40 and 48 are amended. Claims 8, 16, 23, 31, 39, 47 and 55 are cancelled. Claims 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54 and 56-58 are currently pending.
2. Amendment received on 04/16/2007 was entered into record. Claims 1, 9, 12, 17, 24, 32, 35, 40 and 48 were amended.
3. Applicant's submission filed on 09/11/2006 was entered. Claims 1, 9, 17, 24, 32, 40 and 48 were amended.
4. Amendment received on 02/27/2006 was entered into record. Claims 9, 12, 17, 32, 35, 48 and 51 were amended. Claims 56-58 were new.

Priority

5. This application has no priority claim made. The filing date is 12/07/2001.

Drawings

6. Applicant has claimed the limitations of "creating a plurality of multi-feature packet processing rules, ...", "populating said plurality of multi-feature packet processing rules ...", "populating an associated content-addressable memory ..." and/or similar claim language in independent claims 1, 9, 17, 24, 32, 40 and 48. However, there is no figure showing these

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limitations. Applicant is advised to amend the drawings with proper description in the specification with reference mappings to the original specification and claim language to show these limitations if they are included in an allowed claim language set.

Claim Rejections - 35 USC § 112, second paragraph

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 18-22 and 58 are rejected under 35 U.S.C. 112, second paragraph as following:

- a. Claim 18 recites the limitation of "The network element comprising the pocket processing rule lookup system of claim 8" where the claim 8 is cancelled. There is insufficient antecedent basis for this limitation in the claim. Claim 18 and its dependent claims 19-22 are rejected. For the purpose of applying art, claim 18 is read as "The system of claim 17 is a network" and claims 19-22 are read as with the limitation of "The system of claim 18, ..." instead of "The network element of claim 18, ..."
- b. Claim 58 recites the limitation of "The network element of claim 17, ..." There is insufficient antecedent basis for this limitation in the claim. For the purpose of applying art, claim 58 is read with the limitation of "The network element of claim 17, ..." instead of "The system of claim 17, ..."

Clarification and/or correction are required.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54 and 56-58 are rejected under 35

U.S.C. 103(a) as being unpatentable over Uga et al. (US 6718326 B2), hereinafter referred as Uga and in view of Venkatachary et al. (US 20020089937 A1), hereinafter referred as Venkatachary.

- a. Uga shows (claim 1) a method of processing a packet comprising: populating a said plurality of multi-feature packet processing rules in a multi-feature classification memory (Fig. 3 and 20, column 2, lines 33-52: packet classification rule table; column 20, lines 37-43: packet classification search through a table of plurality rules); and populating an associated content-addressable memory with a plurality of indices, wherein said indices are indices of said plurality of multi-feature packet processing rules in said multi-feature classification memory (Fig. 4, column 10, lines 52-61: search information flags and search related information search tags grouped, inputted to said content addressable memory and comparison related information showing rules for next searching), and said content-addressable memory and said multi-feature classification memory are associated with one another by virtue of said content-addressable memory being coupled to provide an index of said indices to said multi-feature classification memory, and each of said indices corresponds to at least one of said multi-feature packet processing rules (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing

device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Uga does not explicitly show (claim 1) creating a plurality of multi-feature packet processing rules, wherein said creating comprises, for each multi-feature packet processing rule of said multi-feature packet processing rules, forming said each multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, and at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy.

However, Uga does show (claim 1) the rules to which the grouped fields are related (column 4, lines 54-65); combine and store grouped fields included in the rules into a plurality of groups (column 5, line 27-49).

- b. Venkatachary shows (claim 1) creating a plurality of multi-feature packet processing rules, wherein said creating comprises, for each multi-feature packet processing rule of said multi-feature packet processing rules, forming said each multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, and at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule

merging technique called Rule Subset Hoisting, creating a new sub-database) in an analogous art for the purpose of packet matching.

- c. It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to modify Uga's function's (column 4, lines 54-65) packet classification search using a rule table, search information flags and search related information search tags with Venkatachary's functions of (paragraphs 6-7) packet matching system using Content Addressable Memory storing and selecting NPCR built upon hierarchical subdivision tree.
- d. The modification would have been obvious because one of ordinary skill in the art would have been motivated to combine Venkatachary's merging NPCR rules built upon hierarchical subdivision tree in the art of packet processing based grouped rules for further action as per Uga (column 4, lines 54-65 and column 5, line 27-49) and Venkatachary (paragraph 7).
- e. Regarding claim 2, Uga shows further comprising: identifying a classification of said packet (column 20, line 37-43: classify the flow of said packed); and using said classification to identify said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).
- f. Regarding claim 3, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).
- g. Regarding claim 4, Uga shows further comprising: receiving said packet (column 20, lines 61-63: packed inputted); finding a match for said classification in said

associated content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and receiving one of said indices from said associated content-addressable memory for one of said multi-feature packet processing rules in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).

- h. Regarding claim 5, Uga shows further comprising: using said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- i. Regarding claim 6, Uga shows further wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).
- j. Regarding claim 7, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).

- k. Regarding claim 56, Uga shows further comprising: retrieving a one of said plurality of indices stored in an entry of said associated content-addressable memory by accessing said entry of said associated content-addressable memory, wherein said one of said plurality of indices is stored in said entry of said associated content-addressable memory (column 12, lines 45-50: receives result from the match of input data with the content addressable memory); and accessing a one of said plurality of multi-feature packet processing rules in said multi-feature classification memory using said one of said plurality of indices, wherein said one of said plurality of indices corresponds to said one of said plurality of multi-feature packet processing rules (column 12, line 51-column 13, line 2: read in actions, next Flag and association Tag).
- l. Regarding claim 9, Uga shows a method of processing a packet comprising: identifying a classification of said packet in a content-addressable memory (column 20, line 37-43: classify the flow of said packed); causing said content-addressable memory to provide an index of a plurality of indices to a multi-feature classification memory, wherein said index corresponds to said classification (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions); locating a multi-feature packet processing rule in a multi-feature classification memory (column 20, line 37-43: actions to be performed), said locating uses said index, and said content-addressable memory and said multi-feature

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classification memory are coupled to one another by virtue of said content-addressable memory being coupled to provide said index to said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from packet header; compares related information for showing rules for search or actions). Venkatachary shows said multi-feature packet processing rule created by forming said multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database).

- m. Regarding claim 10, Uga shows further comprising: processing said packet according to said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).
- n. Regarding claim 11, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).

- o. Regarding claim 12, Uga shows further comprising: receiving said packet (column 20, line s61-63: packed inputted); finding a match for said classification in a said content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and receiving an said index from said content-addressable memory for said multi-feature packet processing rule in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- p. Regarding claim 13, Uga shows further comprising: using said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- q. Regarding claim 14, Uga shows further wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).
- r. Regarding claim 15, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM

memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).

- s. Regarding claim 57, Uga shows wherein
- t. said identifying generates an index (column 12, line 51-column 13, line 2: read in actions, next Flag and association Tag), and said locating uses said index to locate said multi-feature packet processing rule (column 12, line 51-column 13, line 2: compare association Tag; column 11, lines 8-12: association Tag has the same values as the rule numbers).
- u. Regarding claim 17, Uga shows a packet processing rule lookup system for processing a packet comprising: a multi-feature classification memory wherein said multi-feature classification memory is configured to store a plurality of multi-feature packet processing rules (Fig. 3 and 20, column 2, lines 33-52: packet classification rule table; column 20, lines 37-43: packet classification search through a table of plurality rules), said each of said multi-feature packet processing rules is configured to allows said packet to be processed with regard to a set of said features corresponding to said each of said multi-feature packet processing rules (column 20, line 37-43: actions to be performed); and a content-addressable memory coupled to said multi-feature classification memory, wherein said content-addressable memory is configured to store a plurality of indices, and each of said indices corresponds to at least one of said plurality of packet processing rules for a plurality of features (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as

search data from IP packet header; compares related information for showing rules for next search or actions). Venkatachary shows each of said multi-feature packet processing rules comprises a merged set of features, said merged set of features comprise a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database).

- v. Regarding claim 18, Uga shows a network element comprising the packet processing rule lookup system of claim 8 (column 20, lines 37-43: a packet classification search device).
- w. Regarding claim 19, Uga shows further comprising: a processor coupled to said multi-feature classification memory (column 20, line 61-column 21, line 12: a processing device), said processor is configured to process a plurality of packets according to said plurality of packet processing rules ((column 20, line 37-43: actions to be performed).
- x. Regarding claim 20, Uga shows further comprising: a network interface coupled to said processor (Fig. 1, item 300s), said network interface is configured to provide

input output interface for said network element (column 20, line 61-column 21, line 12: packets inputted; Fig. 1, output to switch); and a memory coupled to said processor, said memory is configured to store information (Fig. 2, content addressable memory).

- y. Regarding claim 21, Uga shows wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).
- z. Regarding claim 22, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).
- aa. Regarding claim 58, Uga shows wherein said content-addressable memory is configured to provide a one of said plurality of indices to said multi-feature classification memory (column 11, lines 8-12: association Tag has the same values as the rule numbers), in response to an entry of said associated content-addressable memory being accessed, wherein said one of said plurality of indices is stored in said entry of said associated content-addressable memory (column 10, lines 52-61: Search Tag corresponds to association Tag), and said multi-feature classification memory is configured to produce a one of said plurality of packet processing rules for said plurality of features, in response to receiving said one of said plurality of indices, wherein said one of said plurality of packet processing rules for said plurality of

features corresponds to said one of said plurality of indices (column 20, line 61-column 21, line 12: either for action or continue for search).

- bb. Regarding claim 24, Uga shows a network element (column 20, lines 37-43: a packet classification search device) comprising: means for populating said plurality of multi-feature packet processing rules in a multi-feature classification memory (Fig. 3 and 20, column 2, lines 33-52: packet classification rule table; column 20, lines 37-43: packet classification search through a table of plurality rules); and means for populating an associated content-addressable memory with a plurality of indices, wherein said indices of said plurality of multi-feature packet processing rules in said multi-feature classification memory (Fig. 4, column 10, lines 52-61: search information flags and search related information search tags grouped, inputted to said content addressable memory and comparison related information showing rules for next searching), said content-addressable memory and said multi-feature classification memory are associated with one another by virtue of said content-addressable memory being coupled to provide an index of said indices to said multi-feature classification memory, and each of said indices corresponds to at least one of said multi-feature packet processing rules (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Venkatachary shows means for creating a plurality of multi-feature packet processing rules, wherein said means for creating comprises, for each multi-feature packet processing rule of said

multi-feature packet processing rules, means for forming said each multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, and at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database).

- cc. Regarding claim 25, Uga shows further comprising: means for identifying a classification of said packet (column 20, line 37-43: classify the flow of said packed); and means for using said classification to identify said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).
- dd. Regarding claim 26, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).
- ee. Regarding claim 27, Uga shows further comprising: means for receiving said packet (column 20, lines 61-63: packed inputted); means for finding a match for said classification in said associated content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and means for receiving one of said indices from said associated content-addressable

- memory for one of said multi-feature packet processing rules in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- ff. Regarding claim 28, Uga shows further comprising: means for using said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- gg. Regarding claim 29, Uga shows wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).
- hh. Regarding claim 30, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).
- ii. Regarding claim 32, Uga shows a network element (column 20, lines 37-43: a packet classification search device) comprising: a content-addressable memory (Fig. 2, item 621); means for identifying a classification of said packet in said content-addressable

memory (column 20, line 37-43: classify the flow of said packed); means for causing said content-addressable memory to provide an index of a plurality of indices to a multi-feature classification memory, wherein said index corresponds to said classification ((Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions); means for locating a multi-feature packet processing rule in a multi-feature classification memory (column 20, line 37-43: actions to be performed); and said means for locating is configured to use said index, and said content-addressable memory and said multi-feature classification memory are coupled to one another by virtue of said content-addressable memory being coupled to provide said index to said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Venkatachary shows said means for locating comprises a means for forming said multi-feature packet processing rule, said means for forming comprises means for merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet

header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database).

- jj. Regarding claim 33, Uga shows further comprising: means for processing said packet according to said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).
- kk. Regarding claim 34, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).
- ll. Regarding claim 35, Uga shows further comprising: means for receiving said packet (column 20, line 51-63: packet inputted); means for finding a match for said classification in said content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and means for receiving said index from said content-addressable memory for said multi-feature packet processing rule in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- mm. Regarding claim 36, Uga shows further comprising: means for using said index to receive said multi-feature packet processing rule from said multi-feature classification

memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).

nn. Regarding claim 37, Uga shows wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).

oo. Regarding claim 38, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).

pp. Regarding claim 40, Uga shows populate a plurality of multi-feature packet processing rules in a multi-feature classification memory (Fig. 3 and 20, column 2, lines 33-52: packet classification rule table; column 20, lines 37-43: packet classification search through a table of plurality rules), and populate an associated content-addressable memory with a plurality of indices, wherein said indices are indices of said plurality of multi-feature packet processing rules in said multi-feature classification memory (Fig. 4, column 10, lines 52-61: search information flags and search related information search tags grouped, inputted to said content addressable memory and comparison related information showing rules for next searching), said content-addressable memory and said multi-feature classification memory are

associated with one another by virtue of said content-addressable memory being coupled to provide an index of said indices to said multi-feature classification memory, and each of said indices corresponds to at least one of said multi-feature packet processing rules (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Venkatachary shows a computer program product (paragraph 6: matching engine) comprising: a set of instructions executable on a computer system, wherein said computer product is configured to process a packet by virtue of said computer product comprising said set of instructions (paragraph 6: packet matching system), and said set of instructions is configured to create a plurality of multi-feature packet processing rules, wherein said set of instructions configured to create comprises a subset of instructions configured to, for each multi-feature packet processing rule of said multi-feature packet processing rules, form said each multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, and at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the

number of sub-rule databases via a rule merging technique called Rule Subset

Hoisting, creating a new sub-database); computer readable storage media, wherein

said computer program product is encoded in said computer readable storage media

(paragraph 6: matching engine).

- qq. Regarding claim 41, Uga shows wherein said set of instructions is further configured to: identify a classification of said packet (column 20, line 37-43: classify the flow of said packet); and use said classification to identify said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).
- rr. Regarding claim 42, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).
- ss. Regarding claim 43, Uga shows wherein said set of instructions is further configured to: receive said packet (column 20, lines 61-63: packet inputted); find a match for said classification in said associated content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and receive one of said indices from said associated content-addressable memory for one of said multi-feature packet processing rules in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).

- tt. Regarding claim 44, Uga shows wherein said set of instructions is further configured to: use said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).
- uu. Regarding claim 45, Uga shows wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).
- vv. Regarding claim 46, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).
- ww. Regarding claim 48, Uga shows a computer system comprises a content addressable memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions); identify a classification of said packet in said content-addressable memory (column 20, line 37-43: classify the flow of said packed); causing aid content-addressable memory to provide an index of said indices to said multi-feature classification memory, wherein said index

corresponds to said classification (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions), and locate a multi-feature packet processing rule in a multi-feature classification memory (column 20, line 37-43: actions to be performed); said locating users index, and said content-addressable memory and said multi-feature classification memory are coupled to one another by virtue of said content-addressable memory being coupled to provide said index to said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13; line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions). Venkatachary shows a computer program product (paragraph 6: matching engine) comprising: a set of instructions executable on a computer system (paragraph 6: packet matching system), said computer program is configured to process a packet by virtue of said computer product comprising said set of instructions; said multi-feature packet processing rule is created by forming said multi-feature packet processing rule by merging a plurality of features from a feature hierarchy, each of said features is defined in said feature hierarchy, at least one of said features in said feature hierarchy comprise another of said features in said feature hierarchy (paragraph 7: Necessary Path Condition Rules (NPCR) and sub-databases are extracted from a Hierarchical Subdivision Tree; paragraph 14: compares the packet header to a set of NPCR, the result of the

comparison defines a subset of classification rules to be searched in order to find a best matching rule; paragraph 43: NPCR can be reduced, along with the number of sub-rule databases via a rule merging technique called Rule Subset Hoisting, creating a new sub-database);); computer readable storage media, wherein said computer program product is encoded in said computer readable storage media (paragraph 6: matching engine).

xx. Regarding claim 49, Uga shows wherein said set of instructions is further configured to: processing said packet according to said multi-feature packet processing rule (column 20, line 37-43: actions to be performed).

yy. Regarding claim 50, Uga shows wherein said classification is based on a plurality of parameters of said packet (column 20, line 37-43: based upon fields included in packet).

zz. Regarding claim 51, Uga shows wherein said set of instructions is further configured to: receive said packet (column 20, line s61-63: packed inputted); find a match for said classification in said content-addressable memory (column 20, line 64-column 21, line 12: search until actions obtained in content addressable memory); and receive an index from said content-addressable memory for said multi-feature packet processing rule in said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).

aaa. Regarding claim 52, Uga shows wherein said set of instructions is further configured to: use said index to receive said multi-feature packet processing rule from said multi-feature classification memory (Fig. 4 and 23; column 12, line 28-column 13, line 16, column 20, line 51-60: packet classification searching processing device inputs to content addressable memory as search data from IP packet header; compares related information for showing rules for next search or actions).

bbb. Regarding claim 53, Uga shows wherein said content-addressable memory is a multi-feature content addressable memory (column 4, lines 54-65: the rules to which the grouped fields are related; column 5, line 27-49: combine and store grouped fields included in the rules into a plurality of groups).

ccc. Regarding claim 54, Uga shows wherein said content-addressable memory is a feature based content-addressable memory bank (column 4, lines 15-32: CAM memory bank; column 20, line 44-50: groups of fields and rules related the grouped fields).

Together Uga and Venkatachary disclosed all limitations of claims 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54 and 56-58. Claims 1-7, 9-15, 17-22, 24-30, 32-38, 40-46, 48-54 and 56-58 are rejected under 35 U.S.C. 103(a).

Response to Arguments

9. Applicant's arguments filed on 10/30/2007 have been fully considered, but they are not persuasive.

- a. Applicant has amended the independent claim language with the limitation of "crating multi-feature packet processing rules by merging features from a feature hierarchy". Examiner has reviewed the amended claim changes in light of applicant's original specification and claim language. Examiner has further reviewed claim rejection as per office action dated 07/13/2007 and its prior art, i.e. Uga. Uga talks about the rules to which the grouped fields are related (column 4, lines 54-65); and combining and storing grouped fields included in the rules into a plurality of groups (column 5, line 27-49). It seems that Uga does not explicitly show the amended claim change. Examiner has searched and found Venkatachary and related non-patent literature, i.e. Gupta et al. (ACM SIGCOMM '99, September 1999, Harvard University) as noted in the Remarks section below. Venkatachary has the amended limitation and is in the art of packet searching/matching. Claim rejections are updated with the amended claim change and recited references from Uga and Venkatachary.
- b. Applicant has argued that Uga does not have the amended claim language change as per 3rd paragraphs on pages 18 and 19. The updated claim rejection reflects the argued limitation, e.g. items a-d in section 8 above.
- c. Applicant has repeated similar argument on indexing from content addressable memory to multi-feature packet processing rules. Examiner has reviewed previous Response to Arguments as per office action dated 06/06/2006, 12/08/2006 and

07/13/2007 on similar argument. They should still be applicable here. Uga has shown Fig. 3 and 4 using Search Tag and Associated Tag for indexing to packet classification rule.

- d. It is the Examiner's position that Applicant has not submitted claims drawn to limitations, which define the operation and apparatus of Applicant's disclosed invention in manner, which distinguishes over the prior art. As it is Applicant's right to claim as broadly as possible their invention, it is also the Examiner's right to interpret the claim language as broadly as possible. It is the Examiner's position that the detailed functionality that allows for Applicant's invention to overcome the prior art used in the rejection, fails to differentiate in detail how these features are unique (see items a and d in section 6). Uga and Venkatachary have shown using content addressable to direct search result to a search result storage device/memory for packet classification search. Similar arts are identified in Reference Cited and Other Publications sections of Uga as well as those listed in the following Remark section. It is clear that Applicant must be able to submit claim language to distinguish over the prior arts used in the above rejection sections that discloses distinctive features of Applicant's claimed invention. It is suggested that Applicant compare the original specification and claim language with the cited prior art used in the rejection section above or the Remark section below to draw an amended claim set to further the prosecution.
- e. Failure for Applicant to narrow the definition/scope of the claims and supply arguments commensurate in scope with the claims implies the Applicant's intent to

broaden claimed invention. Examiner interprets the claim language in a scope parallel to the Applicant in the response. Examiner reiterates the need for the Applicant to more clearly and distinctly define the claimed invention.

Remarks

10. The following pertaining arts are discovered and not used in this office action. Office reserves the right to use these arts in later actions.

- a. Mate et al. (US 20030056001 A1) Selective routing of data flows using a TCAM
- b. Woo (US 20020023089 A1) Modular packet classification
- c. Fowler et al. (US 6504819 B2) Classes of service in an MPOA network
- d. Ginossar (US 6477143 B1) Method and apparatus for packet network congestion avoidance and control
- e. Gai et al. (US 6167445 A) Method and apparatus for defining and implementing high-level quality of service policies in computer networks
- f. Herbert (US 5325445 A) Feature classification using supervised statistical pattern recognition
- g. Schultz et al. (1994 IEEE) CAM-Based Single-Chip Shared Buffer ATM Switch
- h. Joffe et al. (US 6415354 B1) Pipelined methods and apparatus for weight selection and content addressable memory searches
- i. Abdat (US 6484170 B2) Generating searchable data entries and applications therefore
- j. Gupta et al. (ACM SIGCOMM '99, September 1999, Harvard University) Packet Classification on Multiple Fields

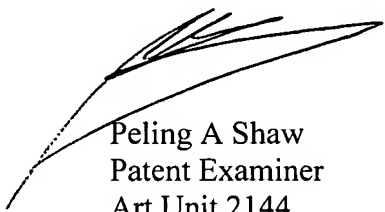
Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Refer to the enclosed PTO-892 for details.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peling A. Shaw whose telephone number is (571) 272-7968. The examiner can normally be reached on M-F 8:00 - 4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William C. Vaughn can be reached on (571) 272-3922. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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pas